FRIDEN PRINTING CALCULATOR

TROUBLESHOOTING GUIDE

PREFACE

The Printing Calculator troubles and corrections on the following pages are offered only as suggestions. This list is not intended to be all inclusive, only common troubles and the usual remedies have been listed.

The best troubleshooting guide is a thorough knowledge of the machine, since this will enable the technician to quickly locate area of the machine and the parts causing the trouble, at which point the correction required will usually be obvious.

LUBRICATION

The following are the recommended lubricants for the 1217 Printing Calculator. The usual procedures and precautions apply.

1. Aircraft Instrument Oil (T-18404) to be used on Actuators, Actuator Bearing Felt Washers, Accumulator Gears, Tens Carry Pawls, Latches, etc. Pendant Gears, Zero Foils, Print Arm Bearings. All other lightly loaded pivot points, guides, bearings, slides, etc.

2. Shell Crankcase Oil (S.A.E.40) is used to lubricate the felt washers on the Drive Shaft.

3. Almasol Grease #450M (T-18586) is used on heavily loaded parts: Cam Followers, Accumulator Restore Sectors, Actuator Drive Sectors, Check Dial Restore Drive Sector and Gear, Check Dial Escapement Comb, lug on rear portion of Equals Slide, Selection Unit Slides. Racks, rollers, gears, pinions, worm gear and worm.

4. Number 2 Oil (T-18194) is used on Check Dial Bearings.

5. Molykote Type G Grease (T-18500) is used on the Drive Worm thrust ball and bearing only.

EQUALS

UNDERCOUNT IN REGULAR MULT OR OVERCOUNT IN SHORT-CUT MULT.

1. Mult sensor not stopping against short cut or mult sector.

   A. Binding multiplier counter shaft, check bearings at left and right sides, shaft should fit freely in nylon bearing on right side. Check with spring unhooked.
   B. Check for .003 end play between multiplier counter ratchet and left side frame.
   C. Check for mult sensor binding in slots on multiplier carriage, or by lip that extends over top of sensing finger. Check Adjustment No. 60.
   D. Check for counter release interponent binding against multiplier ratchet.
   E. Check Adjustment 56, Figure 2, Counter Ratchet Detent Delay Latch. Shows up when multiplying by two's or three's.

2. Counter Feed Pawl entering wrong tooth of counter ratchet.

   A. Check Adjustment No. 59, Figure 1, Counter Feed Cam Follower.
   B. Check position of counter overthrow bracket.
   C. Check counter feed cam follower for binds, missing springs, etc.

3. Rear Pendant fails to enter accumulator.

   A. Check for binding rear pendant Adjustment No. 2.
   B. Check spring rear pendant drive bellcrank.
   C. Rear pendant carrier rollers.
   D. Check plus and minus pinning for binds or being blocked by other controls, check for loose or missing pins.
   E. Check drive shafts timing. Add subtract drive cam follower will fail to release in time for first entry if rear drive shaft is late.
   F. Check add subtract drive cam follower spring.
   G. Check box cam pinning assembly for loose pins, binding parts, etc.
   H. Check accumulator feed gear carrier drive Adjustment No. 44.

OVERCOUNT IN REGULAR MULT OR UNDERCOUNT IN SHORT-CUT MULT.

A. Check Adjustments No, 58, 63, 64, 65, and 66.
B. Check shortcut latch for binds, check spring.
C. Check for binding counter ratchet detent, check spring.
D. Check throw of counter feed cam follower Adjustment No. 59 Figure 1.
E. Check mult sensing finger home position Adjustment No. 51.
F. Check multiplier sector lock bail when sensing nines.
G. Check sign sensing bail Adjustment No. 61.
H. Check high speed micro switch, can advance short cut finger during high speed carriage restore.
I. Check drive shafts timing.

INCORRECT ACCUMULATOR ENTRY

A. Check multiplier carriage for binds, etc.
B. Check Adjustment 60, 51 and 52.
C. Check sign sensing bail for binds, spring, etc.
D. Check Adjustment 61 and 62.
E. Check Neg Equals Link, misformed link could cause erratic control of automatic add-subtract interponent.
F. Check automatic plus and minus bellcrank and plus and minus pinning for loose pins, binds etc.
G. Check feed gear carrier drive Adjustment No. 44.

TERMINATION TOO SOON

A. Check mult termination block for binds spring etc.
B. Check Adjustment No. 54, Figure 2.
C. Check for hook of termination block getting good bite of upper overcapacity rack mounting plate.
D. Multiplier sensing yield missing blocking lip of storage sector detent.
E. Check multiplier sensing slide latch for binds, spring etc.

FAILS TO GO INTO MULT OPERATION

A. Termination slide binding in overcapacity condition.
B. Check Adjustment No. 69 Equals Key latch.
C. Check equals slide latch interponent for binds, spring etc.
D. Check equals slide for binds, spring etc.
E. Check timing rear racks assembly.

FAILS TO TERMINATE EQUALS

A. Machine in overcapacity condition check Adjustment 67, Figure 1, 2, and 3. And Adjustment No. 69.
B. Check overcapacity sensor plate and overcapacity sensing block. Replace plate or block if worn smooth.
C. Check termination slide for binds, spring etc.
D. Check multiplier sensing slide release.
E. Check zero sensing bail for binds, spring etc.
F. Check counter feed cam follower Adjustment No. 59, Figure 1.
G. Check counter follower block for binds, spring etc.
H. Check counter release interponent blocking latch. Counter feed interponent restore.
I. Check equals automatic selection unit escapement Adjustment No. 57.

See Sketch #10 - Equals slide not restoring

CARRIAGE FAILS TO RESTORE AFTER EQUALS OPERATION

A. Check high speed micro switch. High speed carriage restore can cause carriage return control arm to fail to drop in time to contact carriage return cam.
B. Check for backspace control lever lock going into repeat step of backspace control lever. Check Adjustment No. 28 and 70.
C. Check for binds, springs etc., in carriage restore mechanism.

CHECK DIALS FAIL TO RESTORE

A. Check Adjustment 9, Figure 2 Selection Dial Restore
B. Check repeat bails.
C. Check zero latches and sector latches.

SINGLE AND MULTIPLE DIGIT ERRORS

A. Check each check dial for binds.
B. Check dial restore bail for binds, Check Adjustment 9, Figure 2.
C. Check drive shaft anti back up pawl spring.
D. Check Adjustment 4, Actuator stop.
E. Check Adjustment 8, Front Pendant Aligner.
F. Check Adjustment 41, 43, Figure 1, 2, and 3, 44, 45 Figure 1, 2, and 3, and 46.
G. See Accumulator Section.

TRANSFER EQUALS - TO MEMORY

1. Fails to transfer product to memory (Transfers Equals).
   A. Check transfer control bellcrank spring.
   B. Check alignment of front multiplier slide to stud on transfer control bellcrank.
   C. Check Adjustment 49 Times Slide.
   D. Check lifter bail, latches and cam followers.

2. Fails to transfer correct amount to memory.
   A. Check storage unit sector restore Adjustment 9, Figure 1.
   B. Check storage sector engagement with actuator pawls Adjustment 3.
   C. Check actuator pawls, loose studs, bent, etc.
   D. Check for loose pins mult sector restore bail.

3. Memory Keys fail to restore.

   A. Check memory keys release latch.
   B. Check carriage restore overtravel.

FROM MEMORY

1. Transfers wrong amount from memory to print.

   A. Check storage unit sector restore Adjustment 9, Figure 1.
   B. Check for loose pins mult sector restore bail.
   C. Check storage unit sectors engagement with actuator pawls, Adjustment 3.
   D. Check actuator pawls, loose studs, bent, etc.
   E. Check lifter bail, latches, and cam followers.

BACKSPACE

1. Carriage fails to backspace.

   A. Check backspace cam, pin, etc.
   B. Check Adjustment 18, 19, 20 and 21.
   C. Check backspace pawl engagement in rack Adjustment No. 28.
   D. Check backspace lock and spring.

2. First sector fails to restore.

   A. Check Adjustment No. 29 repeat bails.

3. Setting pins fail to restore enough to allow sector to bypass.

   A. Check Adjustment 27, Figure 2.

CLEAR KEYBOARD

1. Prints during clear keyboard operation.

   A. Check clear print block Adjustment 34, Figure 1.

2. Paper feeds during clear keyboard operation.

   A. Check paper feed block Adjustment No. 34, Figure 2.
   B. Check set screws color control shaft and extension shaft.

ADD KEY

1. Sectors fail to restore.

   A. Check Adjustment No. 4 Actuator stop.
   B. Check Adjustment No. 9, Figure 2, Selection Dial Restore.
   C. Check repeat bails for binds, spring, etc.

2. Print Red. Enters Accumulator on Negative Side.

   A. Check add subtract Bellcrank spring.
   B. Check plus and minus pinning for binds, loose pins, etc.
   C. Check add subtract drive cam follower square stud should be latched.

3. Rear Pendant fails to enter accumulator.

    A. Check pendant drive bellcrank spring.
    B. Check box cam pinning for loose pins.
    C. Check rear pendant carrier rollers.
    D. Check accumulator feed gear carrier for binds.

4. Front pendant fails to enter selection unit.

    A. Check front pendant control link and total bellcrank for binds, springs, etc.
    B. Check Adjustment No. 7 and 8. - SEE NOTE ON ADJ. 7
    C. Check aligner latch for binds.

REPEAT ADD

1. Single cycles when key is held down.

    A. Check single cycle disabling Adjustment No. 25.

2. Repeat key fails to restore.

    a. Check Adjustment No, 21, 23, and 25.

3. Sectors restore.

    A. Check repeat bails Adjustment No. 26.

SUBTRACT KEY

1. Plus and minus pinning fails to position correctly on minus operation.

    A. Check Adjustment No. 38 Add pinning control.
    B. Check Adjustment No. 39, Automatic minus bumper stop.

2. Rear pendant fails to enter accumulator

    A. Check Adjustment 44, Feed Gear Carrier Drive.
    B. Check pendant drive bellcrank spring.
    C. Check box cam pinning for loose pins and binds.
    D. Check rear pendant carrier rollers.

3. Sectors fail to restore.

    A. Check Adjustment No. 4, Actuator Stop.
    B. Check Adjustment No. 9, Figure 2, Selection Dial Restore.
    C. Check repeat bails for binds, spring etc.

4. Front Pendant fails to enter Selection Unit.

    A. Check front pendant control link and total bellcrank for binds, springs etc.
    B. Check Adjustment No. 7 and 8.

NON-ADD KEY

1. Rear Pendant enters accumulator.

   A. Check rear pendant drive bellcrank for loose pin.
   B. Check for clearance between ear of pendant drive bellcrank and plus and minus bellcrank hook. If necessary form ear for clearance.
   C. Check plus and minus bellcrank for binds, springs etc.
   D. Check plus and minus pinning for binds.

ENTER DIVIDEND

1. Carriage fails to escape to 16th column

   A. Check Adjustment No. 74, Selection Carriage Escapement - Enter Dividend.
   B. Check action of divided key latch.
   C. Check dividend key latch spring.
   D. Check selection carriage for binds.

2. Clutch fails to open on release of key.

   A. Check enter dividend key spring.

3. Non add entry.

   A. Check enter dividend control link spring.

DIVISION

1. Carriage escapes before divisor prints.

   A. Check Adjustment 74, Selection Carriage Escapement Division.
   B. Check escapement pawl torsion spring.

2. Prints divisor and clutch restores, prints divisor two times.

   A. Check division slide for binds.
   B. Check division slide spring.
   C. Check Adjustment No. 27, Figure 3, Restore clutch plate.

3. Machine keeps running printing divisor each cycle.

   A. Check division program cam for binding or defective clutch

4. Carriage fails to align to left.

   A. Check Adjustment No. 76 and 77, Division Alignment.
   B. Check Adjustment No. 74, Selection Carriage Escapement - Division.
   C. Check division slide for bind, spring etc.
   D. Check carriage for binds.

5. Carriage travels too far to left when aligning division.

   A. Check Adjustment No. 76 and 77, Division Alignment.
   B. Check for binding or bent accumulator sensors.
   C. Check division line up bail assembly for binds.

DIVISION TERMINATES EARLY

1. Front pendant fails to enter selection unit.

   A. Check Adjustment No. 7, Front pendant control.
   B. Check front pendant control link, total bellcrank and memory pinning for binds etc.
   C. Check Adjustment No. 8, front pendant aligner.
   D. Check front pendant aligner spring.
   E. Check bumpers front pendant.

2. Double plus mechanism terminates division.

   A. Automatic add subtract lever misses stud on division latch cam follower.
   B. Check for binding double plus blocking lever.
   C. Check spring double plus blocking pawl and lever.
   D. Check Adjustment 36. If clearance is too small premature termination will occur.
   E. Accumulator fails to get a plus transfer wave on overdraft correction. Check Accumulator.

OVER RUNS IN DIVISION

A. Check Adjustment 76 and 77, Division Alignment.
B. Check Adjustment 36, Division Backspace Bellcrank.
C. Check for bite of division add-subtract interponent and division backspace bellcrank with accumulator in negative condition. If necessary form negative zero block slightly to obtain a safe bite.
D. Fails to get a negative transfer wave check accumulator.
E. Check credit balance indicator, credit balance indicator extension, negative zero, block and division plus and minus interponent for binds.
F. Check drive shafts timing and anti back up pawl.
G. Check division latch live point for binds, spring etc.

INCORRECT QUOTIENT

A. Check division counter tooth for binds, springs etc.
B. Check mult sector detents.
C. Check mult sectors for binds.
D. Check Adjustment No. 9, Figure 1, storage unit sector restore.
E. Check Adjustment No. 3, storage unit engagement with actuator pawls
F. Check Adjustment No. 78 division counter bias bail latching.
G. Check Adjustment No. 9, Figure 2, Selection dial restore.
H. Check each check dial for binds.
I. Check Adjustment No. 8, front pendant aligner.
J. Check mesh of front pendant gears and sectors - Refer to Adjustment 12, Figure 1 and 2, and Adjustment 1 and 2.

K. Check box cam pinning assembly for binds, loose pins etc.
L. Check accumulator see accumulator section.
M. Check drive shaft anti back up pawl.
N. Check quotient bellcrank to disengage front pendant control link from pendant lip before quotient read out.
O. Check Adjustment No. 7, Front pendant control.

FAILS TO TERMINATE

1. Division fails to terminate on carriage restore.

   A. Check Adjustment 27, Figure 3, Restore Clutch Plate.
   B. Check Adjustment 53, Carriage restore clutch plate - Clutch control bellcrank.
   C. Check division termination latch for getting enough throw from division termination trip lever on restore. If necessary form ear on termination latch for more throw.

2. Division fails to terminate with no remainder in accumulator.

   A. Check division add-subtract cam follower spring.
   B. Check Adjustment No. 27, Figure 1, Selection carriage rack.
   C. Check Adjustment No. 28, Backspace pawl engagement in rack.
   D. Check double plus blocking latch and spring.
   E. Check double plus blocking lever for binds, spring etc.

TOTAL AND SUB-TOTAL

1. Rear pendant fails to enter accumulator.

   A. Check Adjustment 46 and Adjustment 44.
   B. Check total pinning and controls for binds, loose pins, missing springs etc.
   C. Check transfer controller block spring.
   D. Check total and sub-total lock bails.
   E. Check for binding box cams and rear pendant.
   F. Check pendant drive bellcrank spring.

2. Rear pendant fails to enter accumulator on negative sub-total.

   A. Check Adjustment 46, total sub-total symbol block to credit balance indicator. If necessary form up slightly in area of stud on total and sub-total control lever to eliminate contact of total and sub-total feed gear block and feed gear driver.

3. Sectors fail to restore.

   A. Check Adjustment No. 9, Figure 2, Selection dial restore.

ACCUMULATOR

1. Transfer Pawls

   A. Binding at rivet.
   B. Dragging accumulator gear.
   C. Transfer pawls slipping off gear.
   D. Transfer pawls dragging against accumulator frames.
   E. Excess wear at transfer point.
   F. Transfer pawls backing up during restore check drive shaft anti back up pawl.

2. Accumulator transfer gears.
   - A. Transfer cam loose on gear or off center.
   - B. Gear loose on hub.
   - C. Dragging against accumulator frames.
   - D. Free mesh with feed gears.
   - E. Excess wear on gear teeth or transfer points.

3. Release levers.
   - A. Check alignment with transfer pawls.
   - B. Check transfer live points for binds.
   - C. Check levers for binds.
   - D. Check for bite of release levers over transfer pawls when restored.

4. Accumulator detents.
   - A. Check springs.
   - B. Check rollers.
   - C. Check alignment with accumulator gears.

5. Feed Gears.
   - A. Check for free mesh with accumulator gears.
   - B. Check for binds against accumulator frames.

6. Fugitive Bails.
   - A. Check for correct alignment with No. 1 transfer pawls.

7. Credit Balance indicator.
   - A. Credit balance indicator, extension, and negative zero block should be free. Check by releasing detent.
   - B. Credit balance indicator extension should be square.